

$$\begin{aligned}
y(0) &= x(0)h(0) \\
y(1) &= x(1)h(0) + x(0)h(1) \\
y(2) &= x(2)h(0) + x(1)h(1) + x(0)h(2) \\
&\dots\dots\dots \\
&\dots\dots\dots \\
y(H-1) &= x(H-1)h(0) + x(H-2)h(1) + x(H-3)h(2) + \dots\dots\dots + x(0)h(H-1) \\
\\
y(H) &= x(H)h(0) + x(H-1)h(1) + x(H-2)h(2) + \dots\dots\dots + x(1)h(H-1) \\
y(H+1) &= x(H+1)h(0) + x(H)h(1) + x(H-1)h(2) + \dots\dots\dots + x(2)h(H-1) \\
&\dots\dots\dots \\
&\dots\dots\dots \\
y(N-1) &= x(N-1)h(0) + x(N-2)h(1) + x(N-3)h(2) + \dots\dots + x(N-H+1)h(H-1)
\end{aligned}$$

----saturation  
 from this  
 point  
 onwards

**Figure 1**

$$\begin{aligned}
y(0) &= x(0)h(0) \\
y(1) &= x(1)h(0) + x(0)h(1) \\
y(2) &= x(2)h(0) + x(1)h(1) + x(0)h(2) \\
y(3) &= x(3)h(0) + x(2)h(1) + x(1)h(2) + x(0)h(3) \\
y(4) &= x(4)h(0) + x(3)h(1) + x(2)h(2) + x(1)h(3) + x(0)h(4) \\
y(5) &= x(5)h(0) + x(4)h(1) + x(3)h(2) + x(2)h(3) + x(1)h(4) + x(0)h(5) \\
y(6) &= x(6)h(0) + x(5)h(1) + x(4)h(2) + x(3)h(3) + x(2)h(4) + x(1)h(5) + x(0)h(6) \\
y(7) &= x(7)h(0) + x(6)h(1) + x(5)h(2) + x(4)h(3) + x(3)h(4) + x(2)h(5) + x(1)h(6) + x(0)h(7) \\
y(8) &= x(8)h(0) + x(7)h(1) + x(6)h(2) + x(5)h(3) + x(4)h(4) + x(3)h(5) + x(2)h(6) + x(1)h(7) + x(0)h(8) \\
y(9) &= x(9)h(0) + x(8)h(1) + x(7)h(2) + x(6)h(3) + x(5)h(4) + x(4)h(5) + x(3)h(6) + x(2)h(7) + x(1)h(8) + x(0)h(9) \\
y(10) &= x(10)h(0) + x(9)h(1) + x(8)h(2) + x(7)h(3) + x(6)h(4) + x(5)h(5) + x(4)h(6) + x(3)h(7) + x(2)h(8) + x(1)h(9) + x(0)h(10)
\end{aligned}$$

Figure 2

$y(0) = x(0)h(0)$   
 $y(1) = x(1)h(0) + x(0)h(1)$   
 $y(2) = x(2)h(0) + x(1)h(1) + x(0)h(2)$   
 $y(3) = x(3)h(0) + x(2)h(1) + x(1)h(2) + x(0)h(3)$   
 $y(4) = x(4)h(0) + x(3)h(1) + x(2)h(2) + x(1)h(3) + x(0)h(4)$   
 $y(5) = x(5)h(0) + x(4)h(1) + x(3)h(2) + x(2)h(3) + x(1)h(4) + x(0)h(5)$   
 $y(6) = x(6)h(0) + x(5)h(1) + x(4)h(2) + x(3)h(3) + x(2)h(4) + x(1)h(5) + x(0)h(6)$   
 $y(7) = x(7)h(0) + x(6)h(1) + x(5)h(2) + x(4)h(3) + x(3)h(4) + x(2)h(5) + x(1)h(6) + x(0)h(7)$   
 $y(8) = x(8)h(0) + x(7)h(1) + x(6)h(2) + x(5)h(3) + x(4)h(4) + x(3)h(5) + x(2)h(6) + x(1)h(7) + x(0)h(8)$   
 $y(9) = x(9)h(0) + x(8)h(1) + x(7)h(2) + x(6)h(3) + x(5)h(4) + x(4)h(5) + x(3)h(6) + x(2)h(7) + x(1)h(8) + x(0)h(9)$   
 $y(10) = x(10)h(0) + x(9)h(1) + x(8)h(2) + x(7)h(3) + x(6)h(4) + x(5)h(5) + x(4)h(6) + x(3)h(7) + x(2)h(8) + x(1)h(9) + x(0)h(10)$   
 $y(11) = x(11)h(0) + x(10)h(1) + x(9)h(2) + x(8)h(3) + x(7)h(4) + x(6)h(5) + x(5)h(6) + x(4)h(7) + x(3)h(8) + x(2)h(9) + x(1)h(10) + x(0)h(11)$   
 $y(12) = x(12)h(0) + x(11)h(1) + x(10)h(2) + x(9)h(3) + x(8)h(4) + x(7)h(5) + x(6)h(6) + x(5)h(7) + x(4)h(8) + x(3)h(9) + x(2)h(10) + x(1)h(11) + x(0)h(12)$

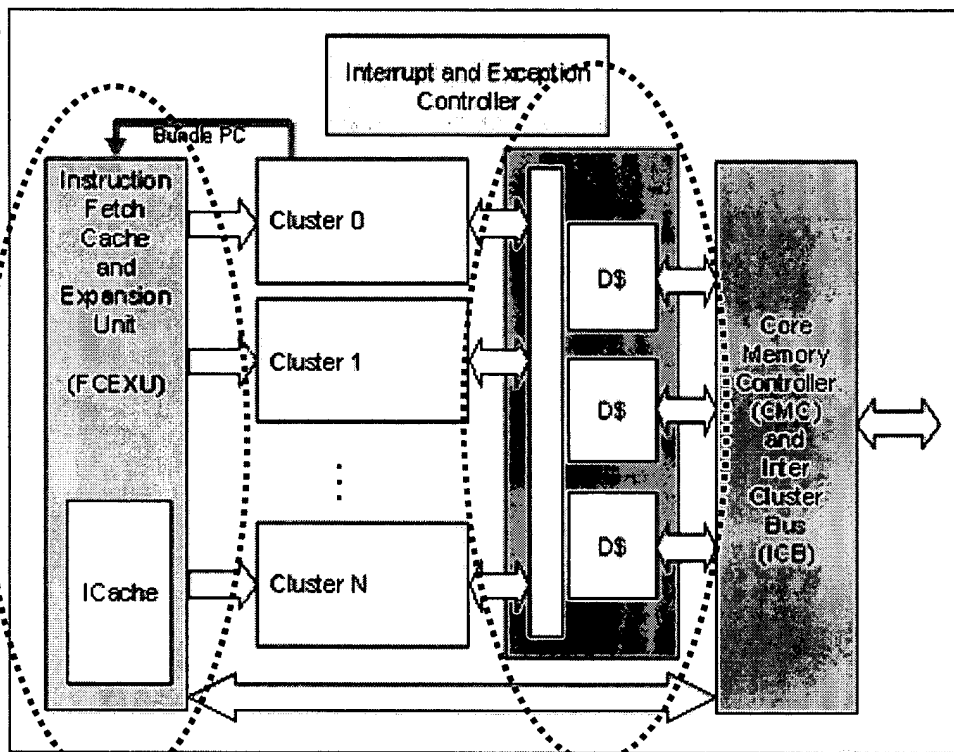
Diagram illustrating the calculation of  $y(n)$  for  $n=0$  to  $12$ . The equations show the recursive calculation of  $y(n)$  based on previous values of  $x$  and  $h$ . The diagram highlights the lack of reusability in the calculation of  $y(n)$  for  $n \geq 1$ , as each calculation involves a new set of  $x$  values.

The diagram also shows the calculation of  $y(n)$  for  $n=0$  to  $12$  using the recursive formula:

$y(n) = x(n)h(0) + x(n-1)h(1) + x(n-2)h(2) + \dots + x(0)h(n)$

The diagram illustrates the lack of reusability in the calculation of  $y(n)$  for  $n \geq 1$ , as each calculation involves a new set of  $x$  values.

Figure 3



Algorithm of the present invention resides

Figure 4

